



Winter 2010/2011

# Pharmacotherapy Update

Lebanon VAMC Pharmacy



## Special points of interest:

- Patient Safety Notice: What you need to know about the summary of FDA and EMA recommendations on Rosiglitazone
- Drug Safety: Are prescription weight loss medications safe to take?
- Drug Review: What is going on with Vitamin D?

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## Editor Notes

Seasons Greetings Lebanon VA!

As the weather turns colder, you can find comfort and warmth in the pages of this issue's Pharmacotherapy Update. First up is a timely article that discusses some of the current concerns dealing with weight loss medications. You will get a quick review of the background and a good summary of the Food and Drug Administration's (FDA) recent recommendations with some of the medications.

The literature review section

reviews the recent TALC study, which deals with the use of the inhaled anticholinergic Tiotropium in patients with uncontrolled asthma.

The Patient Safety section will discuss the new information on Rosiglitazone, comparing the FDA's recommendations with the European Medicines Agency's (EMA) recommendations.

The Drug Review section will discuss another hot topic, vitamin D. The article will go over some of the controversies currently surrounding the fat

soluble vitamin.

Lastly, you can find fun little tips on another way to beat the cold this winter.



Read on and stay warm!

Vy Bui, Pharm.D. and Dina Hunsinger-Norris, Pharm.D., BCPS, Editors.

## Rising Concerns with Weight Loss Medications

By: Amy Best, Pharm.D. Candidate

After indulging in the holiday festivities, many Americans will be determined to achieve their New Year's resolution to lose weight. Some people will begin a new exercise regimen or a low-fat diet, but many will rely on diet pills to augment their weight loss. It should be noted that diet pills have a notorious history of adverse side effects with serious consequences limiting their use and often resulting in their withdrawal from the market.

Obesity in the United States has escalated over the past several decades and continues

to do so reaching epidemic proportions. It is "the most prevalent, fatal, chronic, relapsing, disorder of the 21<sup>st</sup> century."<sup>1</sup> Obesity is a chronic medical condition affecting over one-third of the American population.<sup>2</sup> This is a major public health concern as obesity increases one's risk for developing a variety of health problems including type II diabetes, hypertension, and osteoarthritis just to name a few. Furthermore, it is one of the leading causes of preventable deaths, listed right up there with smoking.

Obesity is officially defined as a Body Mass Index (BMI)  $\geq 30 \text{ kg/m}^2$ . Pharmacological treatment is only indicated for those patients with a BMI  $\geq 30 \text{ kg/m}^2$  or BMI  $\geq 27 \text{ kg/m}^2$  in addition to other medical conditions.

Despite the extensive clinical trials and studies prescription weight loss medications must undergo before receiving FDA approval, post-marketing studies have revealed unforeseen harmful side effects over the years. In 1997, fenfluramine found in the

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## Literature Review: TALC Study

By Annie Sedlak, Pharm.D. Candidate



### Tiotropium Bromide as an Alternative to Increased Inhaled Glucocorticoid in Patients Inadequately Controlled on a Lower Dose of Inhaled Corticosteroid (TALC study)

Severe, uncontrolled asthmatics account for only about 5-10% of all asthmatics; however, this group uses the majority of health care resources accruing more costs than all asthmatics combined.<sup>1</sup> Uncontrolled asthma is classified as patients who require high dose inhaled glucocorticoids or continuous or near continuous oral glucocorticoids plus two of the following minor criteria: require additional daily controller medicine such as a long-acting beta agonist, theophylline, or leukotriene antagonist; require a short-acting beta agonist daily or near daily; have persistent airflow limitation; have one or more urgent care visits related to asthma per year; require three or more periods of oral glucocorticoid use per year; experience prompt deterioration with less than or equal to a 25% reduction in oral or inhaled glucocorticoid use; or experienced a near fatal asthma related event in the past.<sup>2</sup> The last step of therapy currently recommended by the NHLBI guidelines is high dose inhaled corticosteroids plus a long-acting beta agonist plus oral corticosteroids. The long-acting beta agonists (salmeterol and formoterol) were scrutinized after the SMART and SNS trials conducted by the FDA for increasing the risk of asthma exacerbations and asthma related deaths in children and adults; however, the benefit of these medications exceeds this risk when they are used in combination with an asthma-controller medication. The investigators of the TALC study wished to determine if tiotropium, an anticholinergic agent approved for COPD, would be noninferior to the long-acting beta agonist salmeterol and also, if it would be superior to doubling the dose of the inhaled glucocorticoid medication in patients with uncontrolled asthma.

The TALC trial was a three-way, double-blind, triple-dummy, crossover trial of 210 patients with asthma. It included patients 18 years-of-age or older with a history of asthma confirmed by bronchodilator reversibility or bronchial hyperresponsiveness, an FEV<sub>1</sub> of more than 40% of the predicted value, and nonsmoking status (<10 pack-years). Patients were excluded if they used any prohibited drug, had a significant medical illness or lung disease other than asthma, vocal cord dysfunction, respiratory tract infection, significant asthma exacerbation in the previous four weeks, history of life-threatening asthma in the past five years, pregnant or not using birth control if of child-bearing age, hyposensitization therapy other than an established maintenance regimen, or an inability to use the drug delivery devices used in the study. All asthma medications that the patients were previously receiving were stopped. Every patient entered the 14 week run-in period where they received beclomethasone 80 µg twice daily. They were admitted at the end of the run-in period if they had 75% compliance during the period, no medical contraindication to tiotropium, and an FEV<sub>1</sub> of 70% or less of the predicted value, or if during the final two weeks of the period they had symptoms six or more days per week or used a rescue inhaler 6 or more days per week or were awakened by symptoms two or more nights per week.

The primary endpoint was a measure of peak expiratory flow. There were multiple secondary endpoints with the most notable being FEV<sub>1</sub> before bronchodilation, number of asthma-control days (days without symptoms and without use of rescue inhaler), and evening peak expiratory flow. An intention-to-treat analysis was conducted with the original target sample size set at 224 patients. The sample size was reduced to 210 patients which still allowed for a drop-out rate of 10% and provided a power of 90% to detect a between-treatment

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## Patient Safety Notice: Update on Rosiglitazone (Avandia)

By Heather Ulrich, Pharm.D., BCPS, CDE



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On September 23, 2010 the FDA announced to patients and health care providers that, in response to continued safety concerns, the use of rosiglitazone will be significantly restricted.<sup>1</sup> The agency determined that rosiglitazone is permitted to remain on the market only if actions are taken by the manufacturer, Glaxo Smith Kline (GSK) to restrict access and assure safe use. On the same date, the European Medicines Agency recommended removal of rosiglitazone (and associated combination products) from the market in the upcoming months.

GSK has been directed by the FDA to develop a restricted access program under a risk evaluation and mitigation strategy (REMS). Under this program, rosiglitazone will be available to new patients only if glycemic control cannot be obtained with the use of other medications AND there is a medical contraindication to pioglitazone. Patients currently using rosiglitazone will be eligible to continue. All patients will be required to review complete risk information and acknowledge that they understand these risks; documentation in the medication record is required. The restricted access program will require physician, patient, and pharmacist enrollment. Additionally, GSK is required to commission an independent re-adjudication of the RECORD study and put the ongoing TIDE trial on hold.

The evidence of increased ischemic cardiovascular risk with rosiglitazone has been concerning, yet inconsistent. The FDA decision acknowledges disparate opinions of committee members due to varying interpretations of the available data. What is clearer, however, is the lack of similar ischemic cardiovascular risk concerns with pioglitazone. Although both TZD agents have warnings regarding the potential for fluid retention, heart failure, and fractures, data from the prospective PROactive study and a subsequent meta-analysis suggest a potential

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combination PhenFen, was permanently removed from the market along with dexfenfluramine due to case reports of valvular heart disease and pulmonary hypertension as a result of their use. After studies demonstrated phenylpropanolamine (PPA) increased the risk for hemorrhagic stroke in women, it too was removed from the market in 2000. The FDA has also prohibited the use of several over-the-counter weight loss supplements including products containing ephedra in 2004 and the popular brand Hydroxycut® in 2009. Ephedra, a stimulant, had numerous cardiovascular effects including increased blood pressure and heart rate as well as an increased risk for heart attack and stroke while Hydroxycut® caused liver damage.

The most recent withdrawal came in October 2010, when sibutramine, marketed under the brand name Meridia®, was voluntarily withdrawn from the market by the manufacturer as recommended by the FDA. This recommendation was based off data from the Sibutramine Cardiovascular Outcomes Trial (SCOUT) published in the September 2, 2010 issue of *The New England Journal of Medicine*. SCOUT was a randomized, double-blinded, placebo-controlled study with 10,744 study participants. This study funded by Abbott Laboratories "evaluated the long-term effects of sibutramine, as compared with placebo, on the incidence of cardiovascular disease and death among high-risk subjects who were participating in diet and exercise programs."<sup>3</sup> At the end of the 60 month trial, the results demonstrated patients taking sibutramine had a 16% increased risk for a major cardiovascular event such as a non-fatal heart attack or stroke.

Orlistat, more commonly known as the prescription medication Xenical® or the over-the-counter supplement Alli®, has also recently been scrutinized after post-marketing studies revealed several case reports of liver injury in patients taking orlistat. In May 2010, the FDA discovered a total of 13 case reports demonstrating severe liver injury. Three of these cases required a liver transplant while two resulted in liver failure and ultimately death. Orlistat will continue to be commercially available as both a prescription and over-the-counter medication. Although the risk of developing liver injury is rare, the FDA has required that a warning be placed on the labeling notifying patients of the potential risk. The FDA recommends that healthcare professionals should "weigh the benefits of weight-loss with the potential risks associated with Xenical® and Alli® before prescribing or recommending these medications to their patients."<sup>4</sup> Patients should be educated about the signs and symptoms of liver injury such as yellowing of the skin or eyes, dark colored urine, itching, and decreased appetite.

In addition to orlistat, two other FDA approved weight loss medications remain on the market, diethylpropion and phentermine. Both medications are associated with increase blood pressure, pulmonary hypertension, increased heart rate, and the potential for abuse. Two prescription medications are currently up for FDA approval, although both have recently been denied. The first medication, a combination of phentermine and topiramate, was denied approval due to a lengthy list of side effects including increased heart rate, metabolic acidosis, and the potential for birth defects. The FDA requested additional studies to determine the effects on the risk for cardiovascular events and potential birth defects. The second medication, lorcaserin, was also rejected due to a study in rats that demonstrated an association with breast cancer.

With a limited selection of prescription weight loss agents available, many patients will resort to using OTC weight loss agents or herbal supplements. Patients should be educated that such products are not regulated by the FDA and may contain potentially harmful ingredients. Furthermore, many supplements contain caffeine although not plainly stated on the label. For example, ingredients such as guarana, green tea, cola nut, and mate are all sources of caffeine. While pharmacological treatment options may be beneficial for some patients, the most effective and safest way to lose weight is to decrease caloric intake while increasing calorie expenditure.

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*"The FDA recommends that healthcare professionals should 'weigh the benefits of weight-loss with the potential risks associated with Xenical® and Alli® before prescribing or recommending these medications to their patients.'"*



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beneficial effect of pioglitazone on ischemic cardiovascular risk.<sup>2,3</sup> Although a comprehensive review of cardiovascular risk data with rosiglitazone is beyond the scope of this update, key studies are noted below.

The majority of the available evidence stems from meta-analyses of clinical trials designed to investigate the glycemic, not cardiovascular effects of the rosiglitazone. The first article that brought the safety of rosiglitazone into question was a meta-analysis published by Nissen et al in 2007, which demonstrated a 43% increase in the relative risk of myocardial infarction.<sup>4</sup> Although this publication created alarm, it was highly criticized for several reasons, including its exclusion of several key trials. Data from follow up meta-analyses have been conflicting. For example, a Cochrane review did not show a significant increase in the risk of MI, however meta-analyses by Singh et al and Psaty and Furberg did demonstrate statistically significant risk.<sup>5-7</sup> Separate analyses conducted by the FDA and GSK noted an increased risk for any ischemic cardiac event (including chest pain) but no statistically significant increase in the risk for a combined endpoint of MI, stroke, or cardiovascular death.<sup>8,9</sup>

The RECORD trial is the only completed large, prospective, randomized study designed specifically to evaluate cardiovascular events with rosiglitazone.<sup>10</sup> Unfortunately there are a number of limitations to this study, including a lower than anticipated event rate, which affect interpretation of the data. Because this evidence is critical to an accurate safety assessment of rosiglitazone, re-adjudication of the trial has been recommended.<sup>1</sup> As noted above, the TIDE trial, which was designed to compare cardiovascular outcomes with rosiglitazone and pioglitazone, has been placed on full clinical hold.

More data is needed to further clarify the effects of rosiglitazone as well as other existing therapies on ischemic cardiovascular risk. In the meantime, rosiglitazone should be considered only if the use of other agents, including pioglitazone, is contra-indicated. Patients continuing on this therapy must be made aware of and acknowledge the potential risks involved.

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## Drug Review: Vitamin D Update

By Vy Bui, Pharm.D.



Vitamin D has been in the news lately, with a lot of conflicting information being presented. Studies show it is good for the heart! Studies show it causes heart attacks! Does it cause or help with cancer? Adequate Vitamin D levels have long been proven in combination with calcium to help with bone health. But does it have a role in anything else?

### What is normal?

There is currently a lack of consensus for optimal levels of vitamin D in the blood. Levels are reported using 25-hydroxyvitamin D levels (25(OH)D), which are generally considered the best marker for vitamin D status as it has a long-half life, is easy to measure, and correlates well with clinical disease. It is generally accepted that levels above 30ng/mL is considered sufficient levels of vitamin D. However, new evidence suggests that levels at least 75ng/mL is required for good health. The Institute of Medicine is currently reviewing what should be defined as "optimal" 25(OH)D concentrations.

### Reference Ranges for total serum 25-hydroxyvitamin D levels

Deficiency	Severe: <5-10 ng/mL
	Mild-moderate: 10-20 ng/mL
Insufficiency	21-29 ng/mL
Sufficient	>30 ng/mL
Intoxication	>150 ng/mL



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## Pharmacy Pick-Up Lines

Now that the winter is upon us, the cold is starting to really hit. What better way to fight the frigid weather than to curl up with a loved one? For those of you in search of someone (or maybe just want to keep that flame in a current relationship), have no fear! Keep reading for some helpful lines to try next time the opportunity arises!



I wish I was your coronary artery, so that I could be wrapped around your heart.

Is your name Flecainide? Because I think you just made my heart skip a beat.

Excuse me, do you have an Albuterol? Because you just took my breath away.

With you around sweetie, who needs glucose tablets?

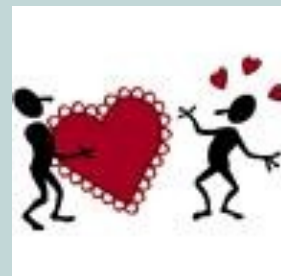
I need a beta-blocker because you just made my heart race.

I must have a low creatinine clearance because I can't seem to get you out of my system.

I was going to use atropine drops for my eye exam tomorrow but a picture of you has enough beauty to dilate my pupils and removed any eye pain.

*And last but surely not least.....*

My love for you is like diarrhea. I can't hold it in.



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### Cardiometaabolic Outcomes

Vitamin D deficiency has been associated with congestive heart failure and higher deposits of calcium in the arteries which can lead to coronary artery disease. Some trials have shown supplementation to have no effect on blood pressure, while others have shown a reduction in systolic blood pressure. Observational data suggests a decrease in incidence of diabetes, but some trials show no effect on glycemic control. Overall, evidence from prospective observational studies and randomized, controlled trials suggest that supplementation at moderate to high doses can have a beneficial effect on reducing the risk of cardiovascular disease. However, there is a threshold upon which the risk for cardiovascular disease does not decrease further which suggests that supplementation will only have a clinically significant effect in those with an existing vitamin D deficiency.

### Skeletal Muscle

Vitamin D and its receptor are important for normal skeletal muscle development. Cross-sectional studies in older adults have found a direct association between vitamin D status and various measurements of physical performance (such as lower extremity muscle strength). Recent studies in adolescent girls found that those with higher 25(OH)D levels had greater muscle power, force, velocity, and jump height than those with lower levels. Most studies have shown that supplementation in older adults is associated with decreased falls. Additionally, Vitamin D deficiency has been linked to musculoskeletal pain. In fact, patients with vitamin D deficiency and musculoskeletal pain may often be misdiagnosed with fibromyalgia, chronic fatigue syndrome, myositis, or other nonspecific collagen vascular diseases. In addition, there is recent evidence that vitamin D supplementation in vitamin D deficient patients taking statins who experience myalgia can reverse the myalgia.

### Asthma and Respiratory Tract Infections

Vitamin D has an important role in the innate immune system, which involves the production of a variety of antimicrobial peptides that are capable of killing viruses, bacteria, and fungi. Vitamin D is involved in the production of the cathelicidin hCAP-18, an antimicrobial peptide that is associated with various respiratory infections. This is particularly evident in the association of vitamin D status with the risk of developing tuberculosis. Studies have shown that higher 25(OH)D levels are associated with increased induction of cathelicidin and lower risk of active TB infections. This association has been extended to various respiratory tract infections with those at lower 25(OH)D levels being more prone to developing both lower and upper respiratory tract infections.

While the exact reason behind it is unclear, some studies have shown that low levels of vitamin D are correlated with lower pulmonary function and asthma. However, a Finnish Cohort showed that supplementation at  $\geq 2000$  IU/day during the first year of life caused asthma. Other studies showed that vitamin D has no association with asthma and provide only a modest protective effect at best. A small study showed that in asthmatics with steroid resistance, vitamin D supplementation could enhance the responsiveness to steroids.

### Miscellaneous

Vitamin D deficiency has been linked to increased incidence of depression and schizophrenia. As there are vitamin D receptors in the brain, it may be important to have adequate levels of vitamin D for brain development early in life and for mental function maintenance later in life.

There is strong data that vitamin D concentrations in late adolescents and young adults are correlated with the risk of

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difference of 10.6 liters per minute in the morning PEF with a one-sided alpha level of 0.025. The manufacturer of tiotropium had input on the study design, which resulted in an increase in the number of patients who had the Arg/Arg polymorphism in the gene encoding the  $\beta_2$ -adrenergic receptor. A linear mixed-effects model was used to analyze the data.

Treatment with tiotropium resulted in a morning PEF that was 25.8 L/min higher than that of patients receiving a double dose of glucocorticoid (14.4 to 37.1;  $p<0.001$ ). There was no significant difference in morning PEF between tiotropium and salmeterol (-4.8 to 17.5;  $p=0.26$ ). In regards to the secondary outcomes, tiotropium compared to double dose glucocorticoid had an evening PEF of 35.5 L/min higher (24.6 to 46;  $p<0.001$ ), prebronchodilator FEV<sub>1</sub> was 0.10 liters better (0.03 to 0.17;  $p=0.004$ ), and the proportion of asthma-control days had a difference of 0.079 (0.019 to 0.140;  $p=0.01$ ). Tiotropium compared to salmeterol had difference in evening PEF of 10.6 L/min which was not statistically significant ( $p=0.05$ ). Prebronchodilator FEV<sub>1</sub> increased by 0.11 liter ( $p=0.003$ ) and the proportion of asthma-control days had a difference of -0.009 ( $p=0.78$ ). From these results, the authors concluded that tiotropium was superior to doubling the dose of inhaled glucocorticoids in uncontrolled asthmatics with regard to morning PEF, asthma-control days, and prebronchodilator FEV<sub>1</sub>. They also concluded that tiotropium was noninferior to salmeterol with respect to morning PEF, prebronchodilator FEV<sub>1</sub>, and asthma-control days. Furthermore they state, however, that “since we could not examine either the rate of asthma exacerbations or long-term safety issues, our findings cannot be considered clinically directive.”

4-week run-in period	Period 1 (14 weeks)	Wash-out period (2 weeks)	Period 2 (14 weeks)	Wash-out period (2 weeks)	Period 3 (14 weeks)
Beclomethasone 80 µg twice daily	Beclomethasone 80 µg twice daily + <b>Tiotropium 18 µg every morning</b> + Salmeterol placebo	Beclomethasone 80 µg twice daily	<b>Beclomethasone 160 µg twice daily</b> + Tiotropium placebo + Salmeterol placebo	Beclomethasone 80 µg twice daily	Beclomethasone 80 µg twice daily + Tiotropium placebo + <b>Salmeterol 50 µg twice daily</b>
Beclomethasone 80 µg twice daily	<b>Beclomethasone 160 µg twice daily</b> + Tiotropium placebo + Salmeterol placebo	Beclomethasone 80 µg twice daily	Beclomethasone 80 µg twice daily + Tiotropium placebo + <b>Salmeterol 50 µg twice daily</b>	Beclomethasone 80 µg twice daily	Beclomethasone 80 µg twice daily + <b>Tiotropium 18 µg every morning</b> + Salmeterol placebo
Beclomethasone 80 µg twice daily	Beclomethasone 80 µg twice daily + Tiotropium placebo + <b>Salmeterol 50 µg twice daily</b>	Beclomethasone 80 µg twice daily	Beclomethasone 80 µg twice daily + <b>Tiotropium 18 µg every morning</b> + Salmeterol placebo	Beclomethasone 80 µg twice daily	<b>Beclomethasone 160 µg twice daily</b> + Tiotropium placebo + Salmeterol placebo



There are a few positive aspects of this trial; however, there are quite a few more negative aspects that outweigh the good. Some of the positive aspects include its design of three-way, double-blind, triple dummy, and cross-over. It was funded by the National Heart, Lung, and Blood Institute, so the chance of bias is reduced. It employed a linear mixed-effects model to analyze the data which is appropriate for data that is clustered around multiple points, and since each patient was their own control, the data would be clustered around each patient. On the other hand, the choice of peak expiratory flow as the primary outcome was not the most appropriate endpoint to utilize. Peak expiratory flow rates vary considerably between subjects making it very hard to compare one individual's PEF to another's. FEV<sub>1</sub> expressed as percent predicted is the most common endpoint in asthma studies because, according to the NHLBI guidelines, it is the best test for assessing the risk of future events. In addition, the guidelines also state that a “response to therapy” is best measured with a composite of decreased symptoms, decreased use of a short-acting beta agonist, increased FEV<sub>1</sub>, decreased exacerbations, and decreased emergency department visits. Therefore, it is very difficult to draw any solid conclusions from the primary outcome of peak expiratory flow. The trial also used intention-to-treat (ITT) in its analysis. For noninferiority studies, a per protocol analysis should also be performed because ITT includes patients who did not take the treatment as intended so a difference between the groups could be blurred and the chance of falsely finding noninferiority (type I error) is increased. The study cannot statistically claim noninferiority when only conducting an ITT analysis. The manufacturer of tiotropium, Boehringer Ingelheim Pharmaceuticals, increased the number of patients in the trial with the Arg/Arg polymorphism in the gene encoding the  $\beta_2$ -adrenergic receptor. Several studies have shown that patients with this polymorphism on a short-acting and/or long-acting beta agonist had impaired control of their asthma.<sup>3</sup> As a result, patients in this study may have had an impaired response to salmeterol making tiotropium seem as good if not better. The patients did not have to technically be uncontrolled on their previous asthma regimens either. All of their medications were stopped at the beginning of the trial to more or less induce a state of uncontrolled asthma. Each trial of each medication was only 14 weeks long, which is not nearly enough to evaluate the rate of exacerbations and safety outcomes. It was also not relatable to the VA population as 67% of the study population was women aged 30-50. The TALC trial did not provide any definitive results to change current practice and recommend tiotropium be used in asthma patients.

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developing multiple sclerosis (MS). There is less data, however, on vitamin D altering the course of MS although future studies will need to be done before conclusions can be made.

Ecologic studies suggest a correlation between sunlight exposure and both outcome and survival of various cancers. The prognosis of breast, colon and prostate cancer is better when it is diagnosed during summer months and in those who live in areas associated with higher sunlight, suggesting a possible vitamin D effect.

### Caveat

A lot of this data is based on observational data. It is known that vitamin D is a good marker for general health. Those that lead more active lifestyles, are outside more, and eat healthier tend to have higher levels of vitamin D. So the link between low levels of vitamin D and various health issues has some confounders that will only be eliminated with future randomized, clinical trials. Until then, this data must be taken with a grain of salt.

### The bottom line

The specifics on what and how vitamin D works in relation to various disease states are still being hammered out. However, the general consensus is as a population, we are vitamin D deficient. The exact amount of vitamin D needed to maintain good health is still being researched, but the evidence that a deficient state can be harmful to the health is clear. Vitamin D is obtained through sun exposure, diet, or dietary supplements. Few foods (besides fatty fish) have vitamin D, so most people get their vitamin D from the sun. However, due to clothing and lifestyle (most of us spend peak sun exposure times indoors at work), a majority of people are not getting enough vitamin D. This is of particular concern during the winter months as more people are bundled up and staying inside. While many people can get their vitamin D requirements by exposing their arms and legs for 5 to 30 minutes between the hours of 10am and 3pm twice a week, this is not the case for those living north of a line connecting San Francisco, CA with St. Louis, MO with Richmond, VA. Since it takes massive doses of vitamin D to reach vitamin D toxicity, supplements may be the simplest and safest way to fulfill vitamin D needs. The Institute of Medicine currently recommends 200 IU for children and adults up to 50 years of age, 400 IU for adults 51 to 70 years of age, and 600 IU for those  $\geq 71$  years of age. However, most experts agree that without adequate sun exposure, most require 800 to 1000 IU of Vitamin D per day.

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### Pharmacist Corner:

#### Home Based Primary Care Pharmacist

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University of the Sciences in Philadelphia (PCP) - Pharm.D. 2009

**Work Experience:** Medco, Rite Aid, Wise Pharmacy

**Duties:** Home Based Primary Care is a program within the Geriatric Care and Community Service line. He acts as a pharmacy consultant to the program and perform medication reviews which are required by Joint Commission. They have an average of 245 patients throughout the VISN. Patients are referred to HBPC by their provider. Patients are then evaluated for appropriateness to the program based on certain criteria. The goal of the program is to decrease emergency department visits and hospital admissions which ultimately save the VA money.

**Fun fact:** I am married and have 3 daughters and a son

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